

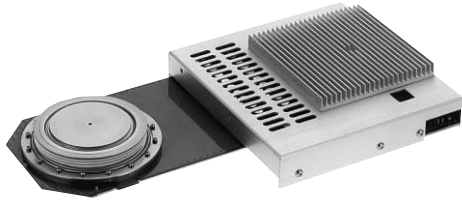
**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI GATE COMMUTATED TURN-OFF THYRISTOR UNIT

**GCU40AB-90**

HIGH POWER INVERTER USE  
 PRESS PACK TYPE

**GCU40AB-90**



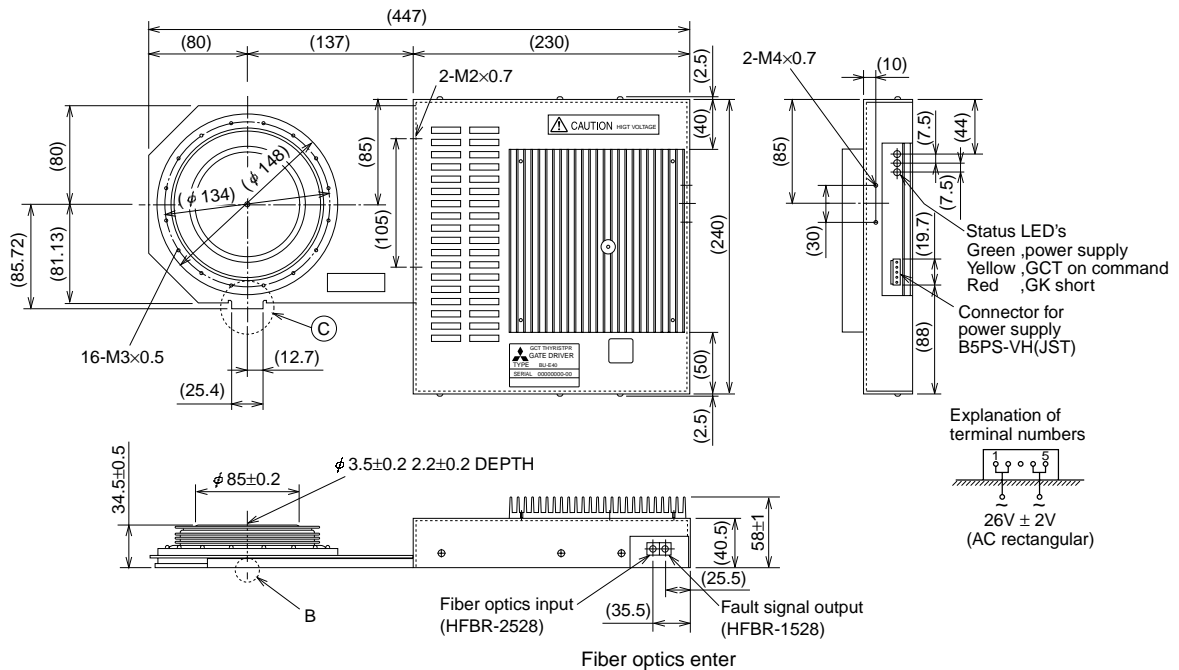
- Asymmetrical GCT unit
- GCT and Gate driver are connected
- ITQRM Repetitive controllable  
 on-state current ..... 4000A
- IT(AV) Average on-state current ..... 1200A
- VDRM Repetitive peak off-state voltage ..... 4500V
- VRRM Repetitive peak reverse voltage ..... 21V

**APPLICATION**

Inverters, DC choppers, Induction heaters, DC to DC converters.

**OUTLINE DRAWING**

Dimensions in mm



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**GCT PART (Type name : FGC4000BX-90DS)**

**MAXIMUM RATINGS**

Symbol	Parameter	Conditions	Voltage class	Unit
VRRM	Repetitive peak reverse voltage	—	21	V
VRSM	Non-repetitive peak reverse voltage	—	21	V
VDRM	Repetitive peak off-state voltage	VGK = -2V	4500	V
VDSM	Non-repetitive peak off-state voltage	VGK = -2V	4500	V
VLTS	Long term DC stability voltage	VGK = -2V, λ = 100 Fit	3600	V

Symbol	Parameter	Conditions	Ratings	Unit
ITQRM	Repetitive controllable on-state current	VDM = 4500V, VD = 2250V, VRG = 20V, LC = 0.3μH Tj = 25/125°C, With GU-E40 (see Fig. 1, 3)	4000	A
IT(RMS)	RMS on-state current	Applied for all condition angles	1800	A
IT(AV)	Average on-state current	f = 60Hz, sinewave θ = 180°, Tf = 70°C	1200	A
ITSM	Surge on-state current	One half cycle at 60Hz, Tj = 125°C Start	25	kA
I <sup>2</sup> t	Current-squared, time integration		2.6 × 10 <sup>6</sup>	A <sup>2</sup> s
diT/dt	Critical rate of rise of on-state current	VD = 2250V, IT = 4000A, Tj = 25/125°C, f = 60Hz With GU-E40 (see Fig. 1,2)	1000	A/μs
VFGM	Peak forward gate voltage		10	V
VRGM	Peak reverse gate voltage		21	V
IFGM	Peak forward gate current		1000	A
IRGM	Peak reverse gate current		3500	A
PFGM	Peak forward gate power dissipation		10	kW
PRGM	Peak reverse gate power dissipation		120	kW
PFG(AV)	Average forward gate power dissipation		200	W
PRG(AV)	Average reverse gate power dissipation		630	W
Tj	Operation junction temperature		-20 ~ +125	°C
Tstg	Storage temperature		-20 ~ +150	°C
—	Mounting force required	(Recommended value 40kN)	32 ~ 48	kN
—	Weight	Typical value	1500	g

**ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V <sub>TM</sub>	On-state voltage	IT = 4000A, Tj = 125°C	—	—	4.0	V
I <sub>RRM</sub>	Repetitive peak reverse current	VRM = 21V, Tj = 125°C	—	—	100	mA
I <sub>DRM</sub>	Repetitive peak off-state current	VDM = 4500V, VGK = -2V, Tj = 125°C	—	—	150	mA
I <sub>GRM</sub>	Reverse gate current	VRG = 21V, Tj = 125°C	—	—	100	mA
dv/dt	Critical rate of rise of off-state voltage	VD = 2250V, VGK = -2V, Tj = 125°C (Expo. wave)	3000	—	—	V/μs
t <sub>gt</sub>	Turn-on time	VD = 2250V, IT = 4000A, di/dt = 1000A/μs, Tj = 125°C With GU-E40 (see Fig. 1, 2)	—	—	3.0	μs
t <sub>d</sub>	Turn-on delay time		—	—	1.0	μs
E <sub>on</sub>	Turn-on switching energy		—	1.0	—	J/P
t <sub>s</sub>	Storage time	VDM = 4500V, VD = 2250V, IT = 4000A VRG = 20V, Tj = 125°C	—	—	3.0	μs
E <sub>off</sub>	Turn-off switching energy	With GU-E40 (see Fig. 1, 3)	—	13	—	J/P
I <sub>GT</sub>	Gate trigger current	VD = 24V, RL = 0.1Ω, Tj = 25°C	—	—	2.5	A
V <sub>GT</sub>	Gate trigger voltage	DC method	—	—	1.5	V
R <sub>th(j-f)</sub>	Thermal resistance	Junction to Fin	—	—	0.011	K/W

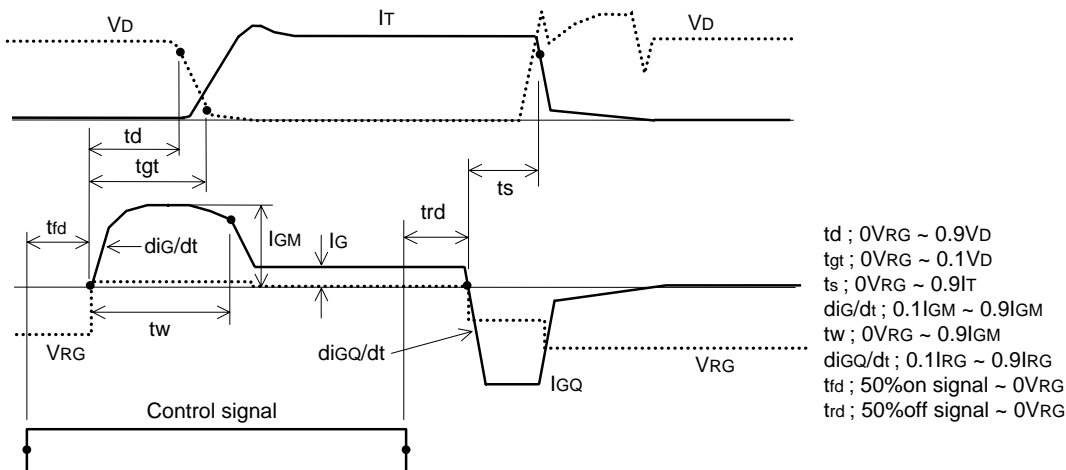
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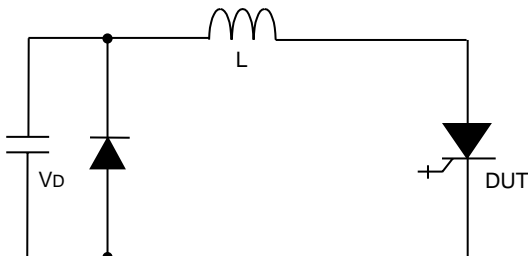
**HIGH POWER INVERTER USE  
 PRESS PACK TYPE**

**GATE DRIVER PART (Type name : GU-E40)**

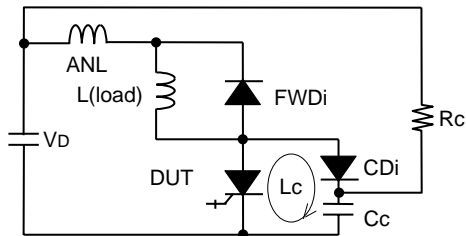
Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
VC	Power supply voltage (Note 1)	AC rectangular, f = 15kHz ~ 100kHz or DC power supply	25.2	28	32.2	V
IC	Power supply current (Note 1)	IT = 1500Arms, f = 500Hz, duty = 0.5	—	—	5	A
—	Control signal	Optical fiber data link Transmitter : HFBR-1528 (HP) Receiver : HFBR-2528 (HP)	—	—	—	—
f	Frequency	IT = 1500Arms, duty = 0.5	—	—	500	Hz
tfd	Delay time of on gate current	Ta = 25°C	—	—	2.0	μs
trd	Delay time of off gate current	Ta = 25°C	—	—	2.0	μs
diG/dt	Critical rate of rise of on gate current		100	—	—	A/μs
IGM	Peak on gate current		—	200	—	A
tw	Width of on high gate current		5	—	—	μs
IG	On gate current	Tj ≥ -10°C	10	—	—	A
diGQ/dt	Critical rate of rise of off gate current	VRG = 20V	—	6000	—	A/μs
Dmax	Maximum duty		—	—	100	%
Ta	Temperature	Operation temperature (Recommend : ≤ 40°C)	-10	—	+60	°C
—	Weight	With FGC4000BX-90DA	—	5300	—	g
Rth(j-f)	Thermal resistance (Junction to Fin) (Note 2)	With FGC4000BX-90DA	—	—	0.012	K/W
—	Status signal (Note 3)		—	—	—	—



**Fig. 1 Turn-on and Turn-off waveform**



**Fig. 2 Turn-on test circuit**



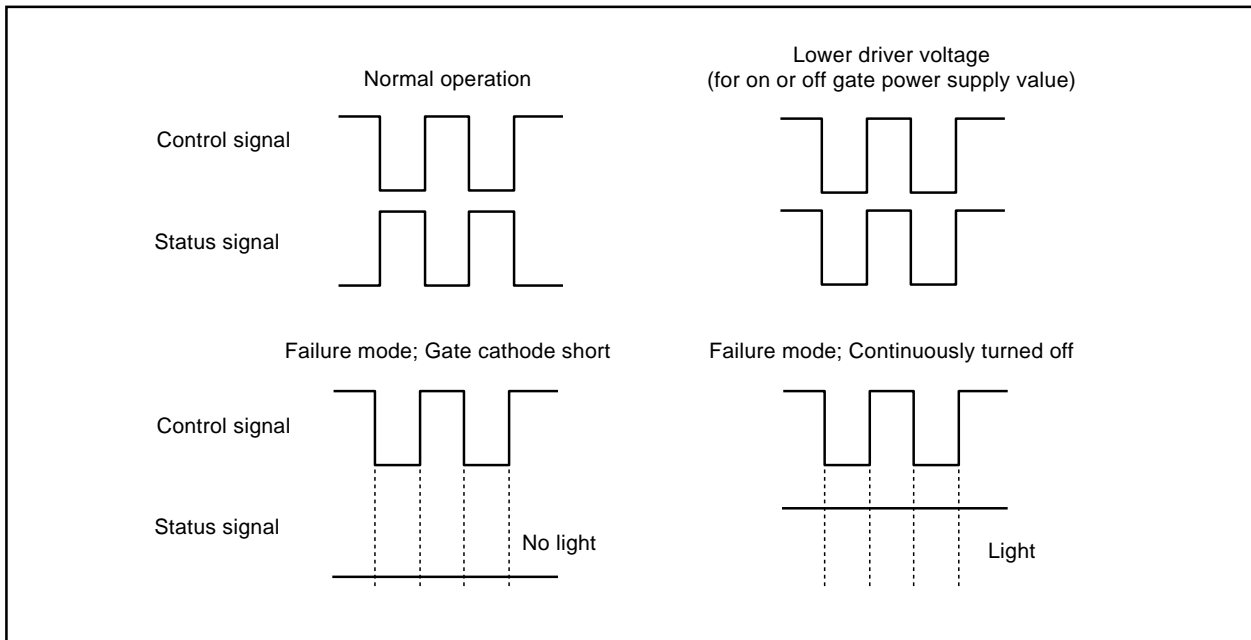
**Fig. 3 Turn-off test circuit (With clamp circuit)**

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- Note 1. Main current condition of GCT Thyristor is 1500Arms, duty = 0.5, f = 500Hz.  
 2. If GU-E40 and FGC4000BX-90DS are used together,  $R_{th(j-f)}$  becomes 0.012K/W.  
 (Only FGC4000BX-90DS is used,  $R_{th(j-f)}$  becomes 0.011K/W)  
 3. Status signal from gate driver  
 (1) Status signal of LED  
     Green : Power supply  
     Yellow: GCT on command  
     Red : GK short  
 (2) status signal of Optic Transmitter



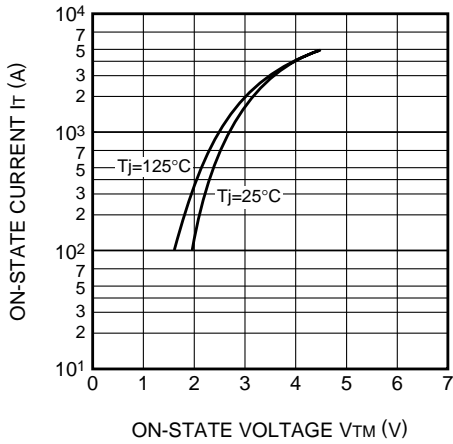
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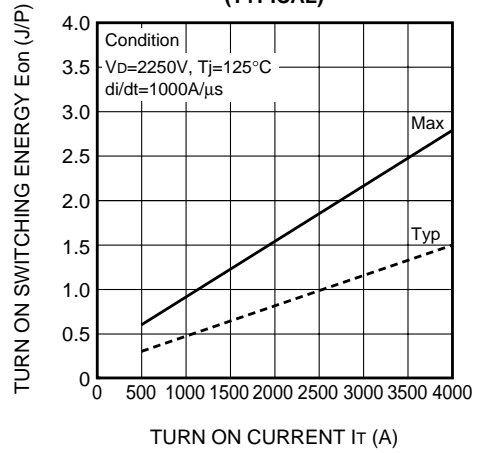
**HIGH POWER INVERTER USE  
 PRESS PACK TYPE**

**PERFORMANCE CURVES**

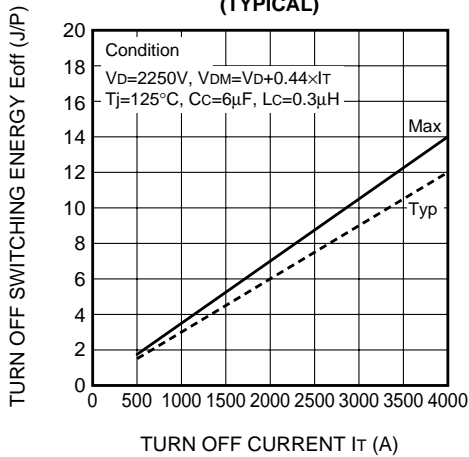
**MAXIMUM ON-STATE CHARACTERISTIC**



**Eon VS It (TYPICAL)**



**Eoff VS It (TYPICAL)**



**MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)**

